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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/521,210	03/08/2000	Hiroshi Tanaka	862.C1856	1390

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EXAMINER

CHAWAN, SHEELA C

ART UNIT	PAPER NUMBER
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2625

DATE MAILED: 02/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/521,210

Applicant(s)
Hiroshi Tanaka

Examiner
Sheela Chawan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above, claim(s) 16-34 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 35, and 36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on Mar 8, 2000 is/are a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some* c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- *See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other:

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DETAILED ACTION

Election/Restriction

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-15, 35-36 are drawn to a position detection apparatus for detecting a position of a mark on an object, classified in class 382, sub class 151.
 - II. Claims 16-34 are drawn to an exposure apparatus, classified in class 356, sub class 401.
2. The inventions are distinct, each from the other because of the following reasons:

The inventions are distinct, each from the other because of the following reasons:

Inventions I, and II, are related as subcombination discloses as usable together in a single combination . The subcombination are distinct from each other if they are shown to be separately usable . In the instant case, invention group I has separate utility such as a position detection of a mark . Invention group II has separate utility such as an exposure apparatus for projecting a pattern on the substrate .
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their classification and recognized divergent subject matter, restriction for examination purposes as indicated is proper.
4. A telephone call was made to Mr. Steven E. Warner on 1/ 31/03 to request an oral election to the above restriction requirement, Mr Steven has elected group I invention with traverse and the claims are 1-15, 35-36 .

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5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventor ship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application . Any amendment of inventor ship must be accompanied by a diligently-filed petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(h).

DETAILED ACTION

Priority

6. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

7. Drawings filed on this 3/8/00 have been approved.

Claim Rejections - 35 U.S.C. § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was

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commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103 (c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1-8,10-15 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al., (US.4,860,374), in view of Kobayasi et al., (US.5,136,661).

As per claim 1,15, 35 and 36 Murakami teaches a position detection apparatus for detecting a position of a mark on an object (column 1, lines 22- 39),comprising:

an extraction section (fig 1, item 203 and 205) for observing the mark and extracting a plurality of edge information of the mark in correspondence with attribute information representing features of the edge information, respectively (column 3, lines 39- 54);

a control section for changing at least one of an extraction rule in said extraction section and an evaluation rule in said position determination section on the basis of the plurality of comparison results by said position determination section and causing said extraction section and said position determination section to execute processing again (column 3, lines 39- 66, column 9, lines 5-55).

Regarding claims 1, 15, 35 and 36 Murakami discloses an apparatus for detecting a position of a reference pattern or mark formed in a substrate to be aligned with a photomask pattern, which relates to a pattern position detection apparatus which can be suitably adapted in a

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wafer alignment apparatus in a semiconductor device manufacturing apparatus such as an optical exposure apparatus, an X-ray exposure apparatus, an electron beam exposure apparatus, etc. and or a scanning electron microscope. However, Murakami fails to teach a position determination section for comparing each edge information with one of a plurality of templates, which is specified by attribute information corresponding to the edge information and evaluating a plurality of comparison results obtained by comparison to determine the position of the mark . However,

Kobayasi discloses a method and apparatus for recognizing the position of an object by correcting mark mounted on a substrate constituting an electronic circuit or the position of parts such as an IC pad . The system comprises of:

a position determination section for comparing each edge information with one of a plurality of templates (fig 5, item 25, column 1, lines 33-50), which is specified by attribute information corresponding (column 2, lines 52- 56) to the edge information and evaluating a plurality of comparison (fig 5, step 25 and 26) results obtained by comparison to determine the position of the mark (column 5, lines 27- 50, column 7, lines 27-68, column 8, lines 1- 4), as shown by Kobayasi the use of plurality of templets because it provides a position recognizing in which edge is detected with a high accuracy (column 2, lines 52- 56) .

Therefore, it would have been obvious to one with ordinary skill in the art at the time of invention to incorporate the teaching as taught by Kobayasi 's into the system of Murakami, because, one with ordinary skill in the art would realize that this would detect an edge with a high accuracy , as suggested by Kobayasi at (column 2 , lines 52-56) .

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As per claim 2, Kobayasi teaches the apparatus according to claim 1, wherein each attribute information represents an edge portion mark (fig 3a) , which is associated with the corresponding edge information (column 2, lines 58- 62).

As per claim 3, Murakami teaches the apparatus according to claim 1, wherein each attribute information represents one of a plurality of extraction conditions under which the corresponding edge information is extracted (column 3, lines 40- 68).

As per claim 4, Murakami teaches the apparatus according to claim 1, wherein said extraction section extracts, as each edge information , information representing an edge position shifted from an actual edge position of the mark by a predetermined distance in one of a plurality of predetermined directions, and each attribute information represents a direction in which an edge position associated with the corresponding edge information shifted from the actual edge position of the mark by the predetermined distance (column 10, lines 55-64, column 14, lines 1- 46) .

As per claim 5, Murakami teaches the apparatus according to claim 1, wherein said extraction section comprises:

an image sensing section for sensing an image of the mark (column 3, lines 33-38, column 5, lines 51- 62) ;

a differential processing section for differentiating the mark image as an image sensing result (column 3, lines 34- 54); and

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an edge information generation section for processing the differential result to generate the edge information corresponding to the attribute information (column 3, lines 34- 54, column 10, lines 4-10) .

As per claim 6, Murakami teaches the apparatus according to claim 5, wherein said differential processing section calculates a change rate of an image signal of the mark image along at least two directions of the mark image (column 6, lines 3-17), and

each attribute information is associated with one of the at least two directions (column 7, lines 50- 65).

As per claims 7 and 8, Murakami teaches the apparatus according to claim 5, wherein each attribute information is associated with a sign of the differential result by said differential processing section (column 7, lines 50-65, column 8, lines 34- 47, column 11, lines 38-41) .

As per claim 10, Kobayasi teaches the apparatus according to claim 1, wherein each template includes, as information to be compared with the edge information, position information of a plurality of points defining a corresponding edge (fig 3 K , column 3, lines 7-38 , column 9, lines 43- 68, column 10, lines 1 - 35) .

As per claim 11, Murakami teaches the apparatus according to claim 1, wherein said extraction section (fig 1) performs noise removal processing for an observation result of the mark and then executes edge information extraction (column 13, lines 40- 62, column 16, lines 25- 49).

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As per claim 12, Murakami teaches the apparatus according to claim 1, wherein said extraction section increases a line width associated with the extracted edge information (column 12, lines 44-58).

As per claim 13, Murakami teaches the apparatus according to claim 1, wherein the extraction rule and/or the evaluation rule determined by said control section is stored in a memory and used as a base for processing to be executed later (column 3, lines 34- 68) .

As per claim 14, Murakami teaches the apparatus according to claim 1, wherein said extraction section observes the mark under dark field illumination (column 5, lines 24-38) .

10. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al., (US.4,860,374), in view of Kobayasi et al., (US.5,136,661), as applied to the above claims 1-8,10-15 35 and 36 and further in view of Hamazaki et al., (US.4,688,088).

Regarding claim 9, Murakami discloses an apparatus for detecting a position of a reference pattern or mark formed in a substrate to be aligned with a photomask pattern, which relates to a pattern position detection apparatus which can be suitably adapted in a wafer alignment apparatus in a semiconductor device manufacturing apparatus such as an optical exposure apparatus, an X-ray exposure apparatus, an electron beam exposure apparatus, etc. and or a scanning electron microscope. However, Murakami fails to teach calculating a change rate of an image signal of the mark image across the mark image along row and column directions of the mark image. However, Hamazaki discloses a method for detecting the position of a mark formed on an object and, more particularly, to position detecting device and method for

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accurately detecting the position of a mark on the basis of image signals obtained by image pickup through image pickup means such as a TV camera or a charge coupled device, upon alignment between a photomask or reticle and a semiconductor wafer prior to exposure processes for the manufacture of semiconductor devices. The system comprises of:

wherein said differential processing section calculates a change rate of an image signal of the mark image across the mark image along row and column directions of the mark image (column 6, lines 53 - 68, column 7, lines 34- 64) , and

each attribute information is associated with one of the row and column directions and the differential result by said differential processing section (column 6, lines 53-68), as shown by Hamazaki the use of the mark image across a row and column directions because this provides a high-precision detection of the position of a mark is stably assured (column 1, lines 35- 38) .

Therefore, it would have been obvious to one with ordinary skill in the art at the time of invention to incorporate the teaching as taught by Hamazaki ' s into the system of Murakami, because, one with ordinary skill in the art would realize a high-precision detection of the position of a mark is stably assured, as suggested by Hamazaki at (column 1, lines 35- 38) .

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Other prior art cited

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hashimoto (US.5,692,072) discloses edge detecting device .

Uzawa et al., (US. 6,333,786) discloses aligning method .

Taniguchi (US. 6,317,195) discloses projection exposure apparatus.

Yamatsu et al., (US. 6,188,467) discloses method and apparatus for fabricating semiconductor devices.

Taniguchi (US. 6,312,859) discloses projection exposure method with correction for image displacement .

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Contact Information

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheela Chawan whose telephone number is (703) 305-4876.

If attempts to reach the examiner on Monday through Thursday from 8:30 a.m. to 5: 00 p.m. by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta , can be reached at (703) 308- 5246.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872 - 9314, (for formal communications intended for entry)

Or: Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703)305- 4750.

See
Sheela Chawan
Patent Examiner
Group Art Unit 2625
Feb 7, 2003

Timothy M. Johnson
TIMOTHY M. JOHNSON
PRIMARY EXAMINER